

Step Three: Chose an element to go up. In this case $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+}$. Rather than memory, this is more common sense.

Step Four: Put the two equation together:



(notice that H^+ is added to the left because it is in an acidic solution. Water is added to the right side to counter the H. If in basic solution, add OH^- to the left and water to the right.)

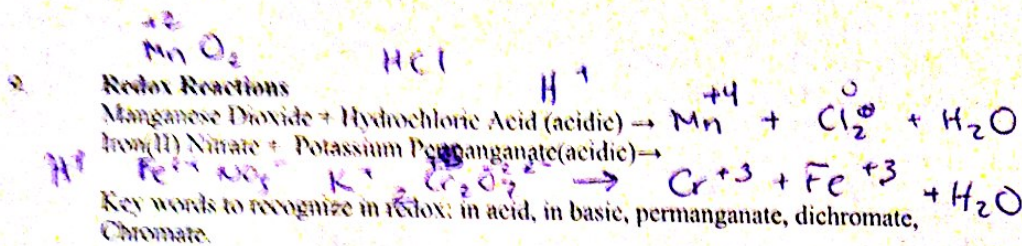
4. Complex Ions

Very few complex ions are used on the AP Exam. Here are the most common.

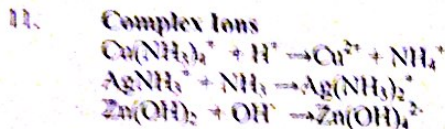
- When NH_3 is added to Ag^+ or Cu^{2+} , it produces: $\text{Ag}(\text{NH}_3)_2^+$ and $\text{Cu}(\text{NH}_3)_4^{2+}$. A rule of thumb is that the number of ligands (things attached to the metal) will be double the oxidation number of the metal.
- When Concentrated OH^- is added to $\text{Zn}(\text{OH})_2$, it will produce $\text{Zn}(\text{OH})_4^{2-}$.
- When SCN^- is added to Fe^{3+} it will form $\text{Fe}(\text{SCN})_6^{3-}$.
- General Rule: Transition metals when reacted with OH^- , SCN^- , and NH_3 will often form complexes.

Worksheet Predicting Products of Chemical Reactions

- Displacement**
Copper(II) Sulfate + Iron \rightarrow ~~Cu~~ iron (II) sulfate + Cu^{+2}
- Double Displacement**
Hydrochloric Acid + Sodium Hydroxide \rightarrow $\text{NaCl} + \text{H}_2\text{O}$
 $\text{HCl} \quad \quad \quad \text{NaOH}$
- Combustion of a Hydrocarbon**
Methane + Oxygen \rightarrow carbon dioxide + water
 $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- Synthesis**
Sodium + Chlorine \rightarrow ~~Na~~ sodium chloride
 NaCl
- Decomposition**
Water \rightarrow $\text{H}_2 + \text{O}_2$ hydrogen gas + oxygen gas
Calcium Carbonate \rightarrow $\text{Ca}^{+2} + \text{CO}_3^{-2}$
Carbonic Acid \rightarrow $\text{H}^+ + \text{CO}_3^{2-}$
- Acid + Carbonate or hydrogen carbonate**
Calcium Carbonate + Hydrochloric Acid \rightarrow $\text{Ca}^{2+} + \text{CO}_2 + \text{H}_2\text{O}$
Sodium Hydrogen Carbonate + Hydrochloric Acid \rightarrow $\text{NaCl} + \text{CO}_2 + \text{H}_2\text{O}$
- Metallic Oxides + Water**
Calcium Oxide + water \rightarrow $\text{Ca}^{+2} + \text{OH}^-$
Sodium Oxide + water \rightarrow ~~Na~~ $\text{Na}^+ + \text{OH}^-$
- Nonmetallic Oxides + water**
Sulfur dioxide + water \rightarrow $\text{HSO}_2^+ + \text{OH}^-$
Chlorine dioxide + water \rightarrow $\text{HClO}_2 + \text{OH}^-$



10. **Nonmetallic oxide bubbled through water**
 Carbon Dioxide is bubbled through an ammonia solution

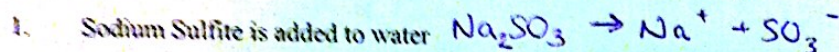


(often the number of ligands attached to the metal will be double the oxidation number of the metal)

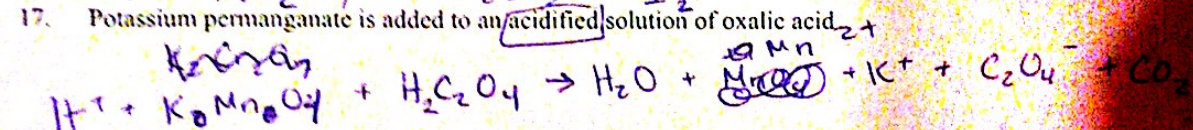
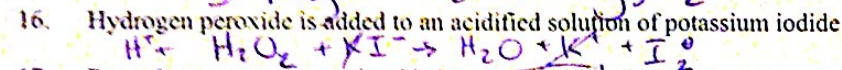
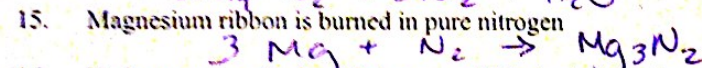
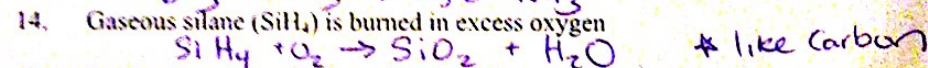
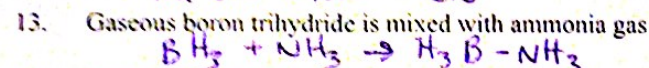
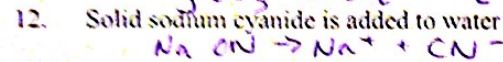
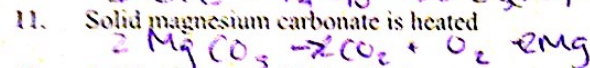
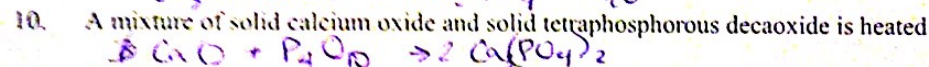
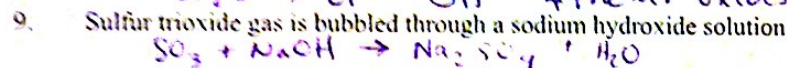
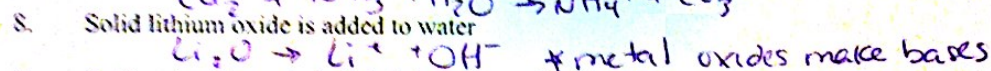
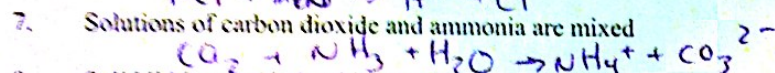
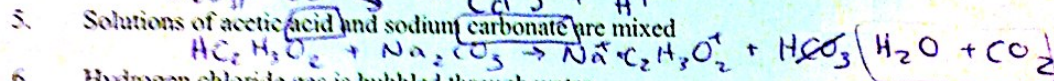
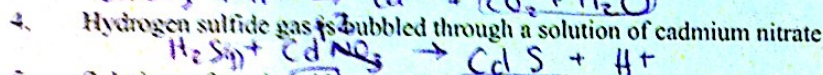
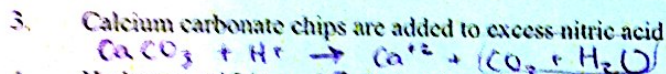
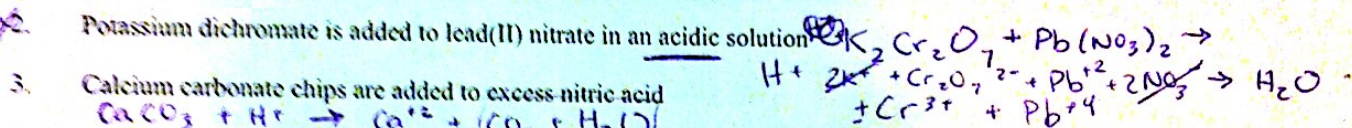
Writing Chemical Reactions

Write net ionic equations. Balancing is not required. Points are given for reactants and products.

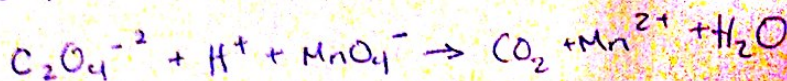
Decomp

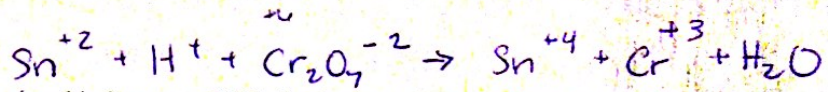


Redox



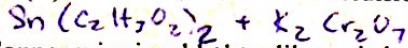
redox



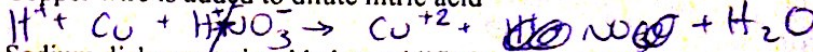


redox

18. Tin(II) acetate is added to an acidified solution of Potassium dichromate

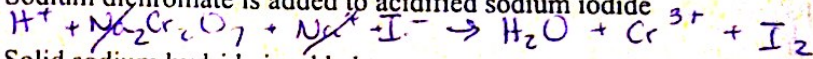


19. Copper wire is added to dilute nitric acid

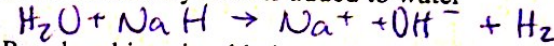


redox

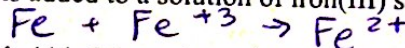
20. Sodium dichromate is added to acidified sodium iodide



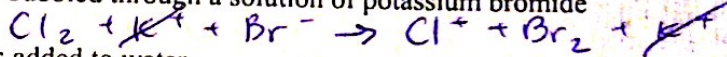
21. Solid sodium hydride is added to water



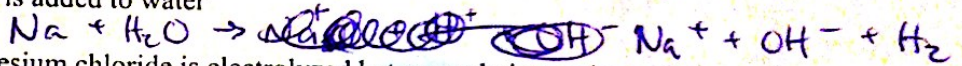
22. Powdered iron is added to a solution of iron(III) sulfate



23. Chlorine gas is bubbled through a solution of potassium bromide



24. Solid sodium is added to water



25. Molten magnesium chloride is electrolyzed between platinum electrodes

